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INDEX II TO THE LITERATURE OF AMERICAN ECONOMIC ENTOMOLOGY

Special Publication 2

INDEX II

TO THE

LITERATURE

OF

AMERICAN ECONOMIC ENTOMOLOGY

January 1, 1915 to December 31, 1919

Compiled by
MABEL COLCORD
Edited by
E. PORTER FELT

AMERICAN ASSOCIATION OF ECONOMIC ENTOMOLOGISTS
MELROSE HIGHLANDS, MASS.
1921

INTRODUCTORY

The preparation of this Index was under the general charge of the special committee of the American Association of Economic Entomologists which started the movement resulting in the Banks' Index. This Index was possible only through the cooperation of Dr. L. O. Howard, Chief of the Bureau of Entomology, United States Department of Agriculture, who kindly detailed Miss Mabel Colcord to have charge of the preparation of the manuscript. To her, and her assistants, as well as to Dr. Howard, the economic entomologists of the world owe a debt of gratitude for the compilation of an immensely serviceable work.

The Index, when turned over to the Editorial Board of the Journal of Economic Entomology, comprised some 48,000 references besides numerous scientific names and other titles. It was necessary to reduce the size of the volume and if possible not seriously impair its value. The immense number of references made it impracticable to consult every citation and there are doubtless many errors of omission, both passive and active, for which the editor will probably be held responsible. There are a number of authors with the same surname. Initials were not included in the manuscript and the editor has not attempted to supply them. Their omission should not result in material confusion.

The following rules were adopted for guidance in this difficult undertaking, there being exceptions, mostly intentional.

The scope was limited to temperate and subtropical America, thus the extreme north and the Hawaiian Islands were excluded.

Only the better established or well known common names have been retained.

Anonymous articles in the agricultural press have been excluded, and all in farm papers in the case of a species or topic with numerous citations, such as Aspidiotus perniciosus and "Spraying." The omission of such citations is indicated by an asterik (*) following the name and in some cases citations of official press bulletins or circulars, the more ephemeral literature, have been omitted because data of value in these media are very likely to appear in bulletins or reports.

The nature of general works is so well indicated by the title that in order to avoid much duplication only a few of the more important subdivisions have been indexed in the following books dealing mostly with rather well known insects:

Essig, E. O., Injurious and Beneficial Insects, 2d Ed., 1915.
Herrick, G. W., Insects of Economic Importance, 1915.
O'Kane, W. C., Injurious Insects, 1916.
Osborn, Herbert, Agricultural Entomology, 1916.
Pierce, W. D., Dangerous Insects Likely to be Introduced in the United States, 1917.
Crosby, C. R., and Leonard, M. D., Manual of Vegetable-Garden Insects, 1918.
Washburn, F. L., Injurious Insects and Useful Birds, 1918.
Lochhead, Wm., Class Book of Economic Entomology, 1919.

There are many excellent contributions dealing with a number of species of the same genus and where possible there has been condensation and the abbreviation "spp." following a name may refer to a group of named species as well as to unknown forms.

E. P. FELT,
W. E. BRITTON,
W. E. HINDS,
W. C. O'KANE,
A. F. BURGESS,
Committee.

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INDEX TO THE LITERATURE OF AMERICAN ECONOMIC ENTOMOLOGY

JANUARY 1, 1915 TO DECEMBER 31, 1919

By MABEL COLCORD

The following Index to the literature of American Economic Entomology for the five year period from January 1, 1915 to December 31, 1919 is a continuation of the Banks' Index, 1905 to 1914 inclusive, as that in turn was a modified extension of the Bibliography of American Economic Entomology published by the United States Department of Agriculture, parts I–V by Samuel Henshaw and parts VI–VIII by Nathan Banks.

The plan of the Banks' Index has been closely followed. The insects and other headings are arranged alphabetically; the references being by authors alphabetically, those by each author chronologically. Practically all anonymous articles have been omitted.

The references may be easily understood after reading the following explanation and referring, when necessary to the list of abbreviations.

"B." means bulletin, "C", circular, "R", report, "P. B.", press bulletin. Publications of experiment stations are referred to simply by State and number of bulletin, circular or report, as "Fla. B. 42" means Bulletin 42 of the Florida Agricultural Experiment Station. In New York, the Cornell bulletins are referred to as "N. Y. C. B."; the Geneva Station bulletins as "N. Y. Geneva B." The bulletins of the United States Department of Agriculture are referred to as "U. S. D. A. B.", the Yearbook articles as "U. S. Y. B."; the Farmers' Bulletins as "U. S. F. B."

"Pr." or "Proc." is used for Proceedings, "Jr." or "J." for Journal. The words "State" and "Annual" are usually omitted in the references, although in a few cases "St." (State) is retained because of possible confusion. The first figure after the "B." or "R." indicates the number of the volume (if a periodical) or of a bulletin or report and the next figure the page; if three or more numbers appear in the same reference the first is the volume, the second the number in the volume and the third the page in the number and a semicolon follows the volume number in all such cases. The year is usually added in all references as it is oftentimes a great help.

Questions of synonymy and nomenclature have been very kindly determined by the following members of the staff of the Bureau of Entomology:

Coleoptera, Mr. E. A. Schwarz and Mr. H. S. Barber.
Hymenoptera, Mr. R. A. Cushman, Mr. A. B. Gahan and Mr. S. A. Rohwer.
Diptera, Dr. J. M. Aldrich.
Orthoptera, Mr. A. N. Caudell.
Neuroptera, Mr. A. N. Caudell.
Odonata, Miss Bertha Currie.
Lepidoptera, Dr. H. G. Dyar and Mr. August Busck.
Hemiptera, Dr. A. C. Baker and Mr. E. H. Gibson.
Coccidae, Mr. E. R. Sasscer and Mr. Harold Morrison.
Termitidae, Dr. T. E. Snyder.
Acarina, Dr. H. E. Ewing.
Parasites of animals, Mr. J. L. Webb.
Diseases of Bees, Dr. G. F. White.
Fungous diseases of insects, Dr. A. T. Speare.

Many helpful suggestions have come also from Mr. R. P. Currie, Mr. C. H. Popenoe, Mr. Jacob Kotinsky and Mr. Nathan Banks.

The preparation of the Index has been greatly facilitated also by the untiring efforts of three clerks of the Bureau, Miss M. G. Champney, Miss Florence Gildersleeve and Mrs. Wyatt L. Ashcraft. Miss Virginia Revere and Mr. G. E. Moore gave great assistance in copying the manuscript.

LIST OF ABBREVIATIONS

The list of abbreviations given below is supplementary to the preceding explanations:

Adv. = Advancement
Advoc. = Advocate
Agr. = Agriculture, Agriculturist, Agritural
Am. or Amer. = American
Ann. = Annals, Annual
App. = Appendix
Archiv. = Archives
Assoc. = Association
B. = Bulletin
B. C. = British Columbia
Bank. = Banker
Bd. = Board
Bien. = Biennial
Biol. = Biological
Bost. = Boston
Br. = Branch
Bur. = Bureau
Bul. = Bulletin
C. = Circular
C. when after N. Y. = Cornell
C. Gentl. = Country Gentleman
Can. = Canada
Clem. = Clemson
Col. = Colmans
Coll. = College
Comm. = Commission
Comp. = Comparative
Confer. = Conference
Cong. = Congress.
Conserv. = Conservation
Contr. = Contribution
Conv. = Convention.
Coop. = Cooperative
Cranb. = Cranberry
Cult. = Cultivator
Cut. = Cutaneous
D. A. = Department Agriculture
Dairym. = Dairyman
Dept. = Department
Dermat. = Dermatology
Destr. = Destructive
Dis. = Diseases
Dom. = Dominion
Ec. = Economic
Ecol. = Ecology
Educ. = Education
Elev. = Elevator
Eng. = Engineering
Ent. = Entomologist, Entomology
Exch. = Exchange
Exp. = Experimental
Exterm. = Extermination
Farm. = Farmer
Fed. = Federal
Fert. = Fertilizer
Flor. = Florist
For. = Forestry
Fr. = Fruit
Fumig. = Fumigation
Fung. = Fungicide
Gard. = Gardeners, Gardening
Gaz. = Gazette
Gen. = General
Gentl. = Gentleman
Geog. = Geographic
Geol. = Geology
Gr. = Grain
Grow. = Grower
Homest. = Homestead
Hort. = Horticulture, Horticulturist
Hosp. = Hospital
Hyg. = Hygiene, Hygienic
Illus. = Illustrated
Impl. = Implement
Indus. = Industrialist
Infec. = Infectious
Infor. = Information
Inj. = Injurious
Ins. = Insect
Insect. = Insecticide
Insp. = Inspection
Internat. = International
Interst. = Interstate
J., Jr. or Jour. = Journal
L. I. = Long Island
Lab. = Laboratory
Lumberm. = Lumberman
Mag. = Magazine
Man. = Manual
Med. = Medicine, Medical
Meet. = Meeting
Mem. = Memoir
Met. = Metallurgical

Mil. = Military
Mill. = Miller
Mod. = Modern
Month. = Monthly
Mos. = Mosquito
Mus. = Museum
N. Eng. = New England
Nat. = National, Naturalist
Northw. = Northwestern
Not. = Notices
Nurs. = Nursery
Off. = Office
Ont. = Ontario
Or. = Orange
Orch. = Orchard
Ott. = Ottawa
P. B. = Press Bulletin
Pac. = Pacific
Path. = Pathological
Pl. = Plant, Planter
Poly. = Polytechnic
Pom. = Pomological
Pop. = Popular
Poult. = Poultry
Prai. = Prairie
Prevent. = Preventive
Proclam. = Proclamation
Prod. = Producer
Prog. = Progressive
Protec. = Protection
Pub. = Public, Publication
Quar. = Quarterly
R. = Report
Rec. = Record
Res. = Research
Rev. = Review
Roy. = Royal
Rur. = Rural
Ry. = Railway
Sci. = Science
Sec. = Secretary
Serv. = Service
Sess. = Session
Soc. = Society
So. = South
South. = Southern
Sp. = Special
St. = State
St. N. = Saint Nicholas
Sta. = Station
Statis. = Statistical
Stockm. = Stockman
Succ. = Successful
Sup. = Supplement
Suppr. = Suppression
Supt. = Superintendent
Surg. = Surgical
Surv. = Survey
S. W. = Southwestern
Syn. = Synopsis
Tech. = Technical
Tr. or Trans. = Transactions
Trop. = Tropical
Univ. = University
U. S. B. = Bulletin U. S. Bureau of Entomology
U. S. D. A. B. = Bulletin U. S. Dept. Agriculture
U. S. F. B. = U. S. Dept. Agr. Farmers' Bulletin
U. S. Y. B. = Yearbook U. S. Dept. Agriculture
Veg. = Vegetation
Vet. = Veterinary
West. = Western
Wkly. = Weekly
Zool. = Zoology

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INDEX OF LITERATURE, 1915–1919

By Mabel Colcord

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Walton, U. S. F. B. 747, 1, 1916.

Brachystola sp.
Milliken, Kans. B. 215, 21, 1916.

Bracon brevicornis, *see* **Habrobracon brevicornis**

Bracon mellitor, *see* **Microbracon mellitor**

Bracon nigropictus, *see* **Macrodyctium nigropictus**

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Bristly rose-worm, *see* **Cladius pectinicornis**
Broad-bean weevil, *see* **Bruchus rufimanus**
Brochymena annulata
Watson, J. Ec. Ent. 9, 527, 1916.
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Somes, Mo. Fruit B. 24, 9, 1914.
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Clemens, N. Y. C. B. 383, 297, 1916.
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Bronze birch borer, *see* **Agrilus anxius**
Bronze cutworm, *see* **Nephelodes emmedonia, Nephelodes minians, Nephelodes violans**
Brown apricot scale, *see* **Lecanium corni**
Brown salt marsh mosquito, *see* **Aedes cantator**
Brown spider beetle, *see* **Ptinus brunneus**
Brown-tail moth, *see* **Euproctis chrysorrhoea**
Brown tick, *see* **Rhipicephalus appendiculatus**
Bruchophagus funebris
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Back & Duckett, U. S. F. B. 983, 12, 14, 1918.
Garman, Ky. B. 213, 318, 1917.
Gilbert & Popenoe, U. S. D. A. C. 35, 20, 1919.
Headlee, N. J. C. 91, 4, 1917.
Metcalf, N. C. R. 38, 23, 1915.
Metcalf, J. Ec. Ent. 10, 74, 1917.
Orton & Chittenden, U. S. F. B. 856, 53, 1917.
Sanborn, Okla. Ext. C. 41, 41, 1916.
Watson, Fla. B. 134, 85, 1917.
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Bruchus fabae, *see* **Acanthoscelides obtectus**

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Back & Duckett, U. S. F. B. 983, 15, 1918.

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Amundson, Cal. Hort. B. 5, 33, 1916.

Bruchus obtectus, *see* **Acanthoscelides obtectus**

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Back & Duckett, U. S. F. B. 983, 11, 1918.
Bethune, Ont. Dept. Agr. B. 251, 25, 1917.
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Huard, Dept. Agr. Prov. Quebec, B. 23, 19, 1916.
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Lathrop, Oreg. Ext. B. 228, 1919.
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Manter, J. Ec. Ent. 10, 190, 1917.
Metcalf, N. C. R. 41, 46, 1918.
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Chermes pinifoliae, *see* **Pineus pinifoliae**
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Currant borer, *see* **Aegeria tipuliformis**

Currant bud mite, *see* **Eriophyes ribis**

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Quaintance, U. S. F. B. 650, 13, 1915.
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Scammell, U. S. F. B. 860, 37, 1917.
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Hyslop, U. S. D. A. B. 156, 21, 1915.
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Satterthwait, U. S. F. B. 1003, 11, 1919.
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Sphenophorus minimus
Satterthwait, U. S. F. B. 1003, 19, 1919.
Sphenophorus obscurus, *see* **Rhabdocnemis obscurus**
Sphenophorus ochreus
Haseman, Mo. B. 134, 11, 1915.
Sphenophorus parvulus
Haseman, Mo. B. 134, 11, 1915.
Satterthwait, U. S. F. B. 1003, 8, 1919.
Sphenophorus pertinax
Hayes, J. Ec. Ent. 9, 120, 1916.
Satterthwait, U. S. F. B. 1003, 16, 1919.
Sphenophorus phoeniciensis
Morrill, Ariz. Comm. Agr. & Hort. R. 7, 39, 1915.
Satterthwait, U. S. F. B. 1003, 18, 1919.

Spray calendar (*Cont'd.*)
Vincent & Edmundson, Ida. C. 1, 1915.
Vincent & Willis, Ida. C. 6, 1918.
Watson, Fla. Dept. Agr. Quar. B. 25, 2, 191, 1915.
White, Miss. Ext. C. 23, 1919.
Winberg, Ala. Poly. Ext. C. 17, 1918.
——— N. J. C. 75, 1917; 76, 1917; 77, 1917; 78, 1917; 79, 1917; 93, 1918; 94, 1918.
——— N. Y. Cornell Post Cd. 1914.
——— Okla. Ext. C. 38, 1916.
——— Va. Dept. Agr. B. 138, 50, 1919.
——— Va. Hort. Soc. B. 1915, 1, 6.
——— Va. Hort. Soc. B. 4; 1, 9, 12, 1916.
——— Va. Hort. Soc. R. 20, 214, 1916.
——— Va. Hort. Soc. B. 5, 1, 8, 1917.
——— Wash. Pop. B. 77, 1915.

Spray calendar, apple
Baldwin, Ind. Ent. R. 8, 129, 1916.
Bentley, Tenn. B. 121, 30, 1918.
Cate & Moren, Jackson Co. Oreg. Path. & Ent. C. 1, 1919.
Dudley, Me. Dept. Agr. R. 16, 51, 1918.
Fulton, N. Y. Geneva C. 57, 12, 1918.
Hadley, Penn. Hort. Assoc. Proc. 58, 127, 1917.
Lassetter, Ark. Ext. C. 57, 1919.
Richards, Ind. Hort. Soc. Tr. 1915, 445, 1916.
Sanders & Brittain, Can. Dept. Agr. Ent. Br. Pub. 1919.
Sherman, N. C. Ext. C. 66, 7, 1918.

Spray calendar—cabbage
Baldwin, Ind. Ent. R. 8, 172, 1916.

Spray calendar, cherry
Baldwin, Ind. Ent. R. 8, 135, 1916.
——— Ind. Hort. Soc. Tr. 1917, 391.

Spray calendar, cucumber
Lassetter, Ark. Ext. C. 61, 1919.

Spray calendar, garden crops
Lassetter, Ark. Ext. C. 62, 1919.

Spray calendar, gooseberries
Baldwin, Ind. Ent. R. 8, 157, 1916.

Spray calendar, grape
Baldwin, Ind. Ent. R. 8, 154, 1916.
Bentley, Tenn. B. 121, 19, 1918.
Lassetter, Ark. Ext. C. 60, 1919.

Spray calendar, melons
Baldwin, Ind. Ent. R. 8, 171, 1916.

Spray calendar, orchard
Carmody, Ky. Ext. C. 24, 1914.
Carmody, Ky. Ext. C. 29, 1915.
Gossard & Green, Ohio Mo. B. 1, 103, 1916.
Sanborn & Mooring, Okla. Farm.-Stock 32, 1218, 1919.

Spray calendar, peach
Baldwin, Ind. Ext. R. 8, 143, 1916.
Bentley, Tenn. B. 121, 36, 1918.
Hadley, Penn. Hort. Assoc. Proc. 58, 129, 1917.
Richards, Ind. Hort. Soc. Tr. 1915, 430, 1916.
Sherman, N. C. Ext. C. 66, 9, 1918.
Stabler, Cal. Cult. 44, 199, 1915.
——— Ind. Hort. Soc. Tr. 1917, 390.

Spray calendar, pear
Fisher & Newcomer, U. S. F. B. 1056, 33, 1919.

Spray calendar, plum
Lassetter, Ark. Ext. C. 59, 1919.
——— Ind. Hort. Soc. Tr. 1917, 391.

Spray calendar, potatoes
Baldwin, Ind. Ent. R. 8, 170, 1916.

Spray calendar, raspberries
Baldwin, Ind. Ent. R. 8, 164, 1916.

Spray calendar, strawberries
Baldwin, Ind. Ent. R. 8, 170, 1916.

Spray calendar, vegetables
Sanborn & Mooring, Okla. Ext. C. 110, 1919.
Sanborn & Mooring, Okla. Farm-Stock. 32, 1220, 1919.

Spray, dormant*
Becker, Ark. B. 141, 1918.
Bentley, Tenn. Dept. Agr. Bien. R. 1917–18, 72.
Blair, Nova Scotia Fr. Gr. Assoc. R. 51, 172, 1915.
Crosby & Mix, N. Y. C. B. 356, 129, 1915.
Drinkard, Va. Hort. Soc. B. 5, 1, 5, 1917.
Merrill, Kans. C. 66, 6, 1918.
Parrott, N. Y. Dept. Agr. B. 97, 33, 1917.
Regan, Mass. B. 184, 47, 1918.
Scott, Adams Co. Fr. Gr. Assoc. Proc. 10, 49, 1914.

Spray formulas*
Baldwin, Mich. Ext. B. 14, 1918.
Bentley, Tenn. Bd. Ent. B. 27, 24, 1918.

Bentley, Tenn. B. 121, 40, 1918.
Chase, Ga. Bd. Ent. B. 54, 9, 1919.
Cook, Can. Hort. 39, 23, 1916.
Cory, Del. Dept. Agr. B. 6, 3, 62, 1916.
Cory, Md. Ext. B. 11, 1918.
Chadwick, J. Jam. Agr. Soc. 21, 185, 1917.
Cruickshank, Wis. Hort. 9, 133, 1919.
Dacy, W. Va. Ext. C. 206, 11, 1918.
Dixon, Tex. Dept. Agr. B. 32, 152, 1913.
Ellett & Grissom, Va. R. 1913–1914, 160, 1915.
Eustace & Pettit, Mich. Sp. B. 73, 14, 1915.
Frank, Wash. Mo. B. 6; 158, 181, 1918.
Garman, Ky. Agr. Labor & Stat. Bien. R. 22, 431, 1918.
Gillam, N. J. C. 63, 1917.
Gossard, Ohio Hort. Soc. R. 52, 9, 1919.
Gray, Cal. B. 269, 344, 1916.
Gunderson, Ill. Hort. Soc. Tr. 49, 440, 1915.
Howard, Mo. & Kans. Farm. 35, 8, 10, 1919.
Hunter, Kans. Hort. Soc. Tr. 34, 184, 1918.
Kirkpatrick, Minn. Ext. B. 40, 17, 1919.
Leonard, Adams Co. Fr. Gr. Assoc. **Proc. 12, 33, 1916**
McHatton, Firor & Kiger, Ga. St. Col. B. 134, 24, 1917.
McHatton, Firor & Ragsdale, Ga. St. Col. B. 120, 25, 1917.
Macoun, Can. Exp. Farm. B. 86, 68, 1916.
Melander, Wash. Pop. B. 107, 1917.
Melander, Wash. Ext. Serv. Ser. 1, 35, 1918.
Melander, Wash. Ext. Serv. Ser. 1, 39, 1918.
Newman, S. C. Ext. B. 42, 36, 1918.
Parrott & Hodgkiss, N. Y. Geneva B. 402, 207, 1915.
Parrott, Hodgkiss & Lathrop, N. Y. Geneva B. 415, 29, 1916.
Pickett, Ill. B. 185, 54, 1916.
Pickett et al., Ill. B. 206, 1918.
Quaintance & Baker, U. S. F. B. 804, 35, 1917.
Robbins & Reinking, Colo. B. 212, 50, 1915.
Ruggles & Stakman, Minn. Hort. 45, 222, 1917.
Starcher, Va. B. 210, 1916.
Starcher et al., Ala. Poly. Ext. C. 18, 40, 1918.
Starcher et al., Ala. Poly. Ext. C. 19, 45, 1918.
Starcher et al., Ala. Poly. Ext. C. 20, 51, 1918.
Starcher et al., Ala. Poly. Ext. C. 21, 59, 1918.
Thayer, Ohio Mo. B. 1, 114, 1916.
Weldon, Cal. Hort. B. 7, 401, 1918.

Spray formulas, arsenic in
Ellett & Grissom, Va. Tech. B. 8, 160, 1915.

Spray formulas, home garden
Whelan, Mich. Ext. B. 14, 1918.

Spray formulas, winter
Melander, Wash. Pop. B. 107, 1917.

Spray gun
Buckingham, Pac. Rur. Press, 95, 169, 1918.
Cruickshank, Ind. Hort. Soc. B. 1, 4, 4, 1919.
Cruickshank, Better Fruit, 14, 4, 12, 1919.
Gaylord, Ind. Hort. Soc. B. 1, 2, 15, 1919.

Spray injury
Childs, Oreg. Hort. Soc. R. 8, 20, 1917.
Fearing, Garden Mag. 25, 325, 1917.
Fisher, U. S. D. A. B. 712, 20, 1918.
Firor, So. Fr. Gr. 20, 76, 1916.
Gray, Cal. Hort. B. 7, 454, 1918.
Gray, Nat. Nurserym. 25, 306, 1918.
Gray, Cal. Hort. B. 7, 454, 1919.
Grossenbacher, Fla. Gr. 12, 5, 15, 1915.
Macoun, Can. Exp. Farms B. 86, 93, 1916.
Patten & O'Meara, Mich. Quar. B. 2, 83, 1919.
Whetzel et al., U. S. F. B. 736, 15, 1916.
Yothers, U. S. F. B. 933, 1918.

Spray materials
Christie, Ind. Ext. B. 80, 1919.
Conant, New Eng. Homest, 72, 21, 13, 1916.
Drinkard, Va. Hort. Soc. B. 5, 1, 4, 1917.
Frank, Wash. Mo. B. 6, 158, 1919.
Herrick, Amer. Agr. 97, 19, 16, 1916.
Herrick, N. Y. Dept. Farms & Markets, Agr. B. 109, 95, 1918.

Spray calendar (*Cont'd.*)
Vincent & Edmundson, Ida. C. 1, 1915.
Vincent & Willis, Ida. C. 6, 1918.
Watson, Fla. Dept. Agr. Quar. B. 25, 2, 191, 1915.
White, Miss. Ext. C. 23, 1919.
Winberg, Ala. Poly. Ext. C. 17, 1918.
——— N. J. C. 75, 1917; 76, 1917; 77, 1917; 78, 1917; 79, 1917; 93, 1918; 94, 1918.
——— N. Y. Cornell Post Cd. 1914.
——— Okla. Ext. C. 38, 1916.
——— Va. Dept. Agr. B. 138, 50, 1919.
——— Va. Hort. Soc. B. 1915, 1, 6.
——— Va. Hort. Soc. B. 4; 1, 9, 12, 1916.
——— Va. Hort. Soc. R. 20, 214, 1916.
——— Va. Hort. Soc. B. 5, 1, 8, 1917.
——— Wash. Pop. B. 77, 1915.

Spray calendar, apple
Baldwin, Ind. Ent. R. 8, 129, 1916.
Bentley, Tenn. B. 121, 30, 1918.
Cate & Moren, Jackson Co. Oreg. Path. & Ent. C. 1, 1919.
Dudley, Me. Dept. Agr. R. 16, 51, 1918.
Fulton, N. Y. Geneva C. 57, 12, 1918.
Hadley, Penn. Hort. Assoc. Proc. 58, 127, 1917.
Lassetter, Ark. Ext. C. 57, 1919.
Richards, Ind. Hort. Soc. Tr. 1915, 445, 1916.
Sanders & Brittain, Can. Dept. Agr. Ent. Br. Pub. 1919.
Sherman, N. C. Ext. C. 66, 7, 1918.

Spray calendar—cabbage
Baldwin, Ind. Ent. R. 8, 172, 1916.

Spray calendar, cherry
Baldwin, Ind. Ent. R. 8, 135, 1916.
——— Ind. Hort. Soc. Tr. 1917, 391.

Spray calendar, cucumber
Lassetter, Ark. Ext. C. 61, 1919.

Spray calendar, garden crops
Lassetter, Ark. Ext. C. 62, 1919.

Spray calendar, gooseberries
Baldwin, Ind. Ent. R. 8, 157, 1916.

Spray calendar, grape
Baldwin, Ind. Ent. R. 8, 154, 1916.
Bentley, Tenn. B. 121, 19, 1918.
Lassetter, Ark. Ext. C. 60, 1919.

Spray calendar, melons
Baldwin, Ind. Ent. R. 8, 171, 1916.

Spray calendar, orchard
Carmody, Ky. Ext. C. 24, 1914.
Carmody, Ky. Ext. C. 29, 1915.
Gossard & Green, Ohio Mo. B. 1, 103, 1916.
Sanborn & Mooring, Okla. Farm.-Stock 32, 1218, 1919.

Spray calendar, peach
Baldwin, Ind. Ext. R. 8, 143, 1916.
Bentley, Tenn. B. 121, 36, 1918.
Hadley, Penn. Hort. Assoc. Proc. 58, 129, 1917.
Richards, Ind. Hort. Soc. Tr. 1915, 430, 1916.
Sherman, N. C. Ext. C. 66, 9, 1918.
Stabler, Cal. Cult. 44, 199, 1915.
——— Ind. Hort. Soc. Tr. 1917, 390.

Spray calendar, pear
Fisher & Newcomer, U. S. F. B. 1056, 33, 1919.

Spray calendar, plum
Lassetter, Ark. Ext. C. 59, 1919.
——— Ind. Hort. Soc. Tr. 1917, 391.

Spray calendar, potatoes
Baldwin, Ind. Ent. R. 8, 170, 1916.

Spray calendar, raspberries
Baldwin, Ind. Ent. R. 8, 164, 1916.

Spray calendar, strawberries
Baldwin, Ind. Ent. R. 8, 170, 1916.

Spray calendar, vegetables
Sanborn & Mooring, Okla. Ext. C. 110, 1919.
Sanborn & Mooring, Okla. Farm-Stock. 32, 1220, 1919.

Spray, dormant*
Becker, Ark. B. 141, 1918.
Bentley, Tenn. Dept. Agr. Bien. R. 1917–18, 72.
Blair, Nova Scotia Fr. Gr. Assoc. R. 51, 172, 1915.
Crosby & Mix, N. Y. C. B. 356, 129, 1915.
Drinkard, Va. Hort. Soc. B. 5, 1, 5, 1917.
Merrill, Kans. C. 66, 6, 1918.
Parrott, N. Y. Dept. Agr. B. 97, 33, 1917.
Regan, Mass. B. 184, 47, 1918.
Scott, Adams Co. Fr. Gr. Assoc. Proc. 10, 49, 1914.

Spray formulas*
Baldwin, Mich. Ext. B. 14, 1918.
Bentley, Tenn. Bd. Ent. B. 27, 24, 1918.

Bentley, Tenn. B. 121, 40, 1918.
Chase, Ga. Bd. Ent. B. 54, 9, 1919.
Cook, Can. Hort. 39, 23, 1916.
Cory, Del. Dept. Agr. B. 6, 3, 62, 1916.
Cory, Md. Ext. B. 11, 1918.
Chadwick, J. Jam. Agr. Soc. 21, 185, 1917.
Cruickshank, Wis. Hort. 9, 133, 1919.
Dacy, W. Va. Ext. C. 206, 11, 1918.
Dixon, Tex. Dept. Agr. B. 32, 152, 1913.
Ellett & Grissom, Va. R. 1913–1914, 160, 1915.
Eustace & Pettit, Mich. Sp. B. 73, 14, 1915.
Frank, Wash. Mo. B. 6; 158, 181, 1918.
Garman, Ky. Agr. Labor & Stat. Bien. R. 22, 431, 1918.
Gillam, N. J. C. 63, 1917.
Gossard, Ohio Hort. Soc. R. 52, 9, 1919.
Gray, Cal. B. 269, 344, 1916.
Gunderson, Ill. Hort. Soc. Tr. 49, 440, 1915.
Howard, Mo. & Kans. Farm. 35, 8, 10, 1919.
Hunter, Kans. Hort. Soc. Tr. 34, 184, 1918.
Kirkpatrick, Minn. Ext. B. 40, 17, 1919.
Leonard, Adams Co. Fr. Gr. Assoc. **Proc. 12, 33, 1916**
McHatton, Firor & Kiger, Ga. St. Col. B. 134, 24, 1917.
McHatton, Firor & Ragsdale, Ga. St. Col. B. 120, 25, 1917.
Macoun, Can. Exp. Farm. B. 86, 68, 1916.
Melander, Wash. Pop. B. 107, 1917.
Melander, Wash. Ext. Serv. Ser. 1, 35, 1918.
Melander, Wash. Ext. Serv. Ser. 1, 39, 1918.
Newman, S. C. Ext. B. 42, 36, 1918.
Parrott & Hodgkiss, N. Y. Geneva B. 402, 207, 1915.
Parrott, Hodgkiss & Lathrop, N. Y. Geneva B. 415, 29, 1916.
Pickett, Ill. B. 185, 54, 1916.
Pickett et al., Ill. B. 206, 1918.
Quaintance & Baker, U. S. F. B. 804, 35, 1917.
Robbins & Reinking, Colo. B. 212, 50, 1915.
Ruggles & Stakman, Minn. Hort. 45, 222, 1917.
Starcher, Va. B. 210, 1916.
Starcher et al., Ala. Poly. Ext. C. 18, 40, 1918.
Starcher et al., Ala. Poly. Ext. C. 19, 45, 1918.
Starcher et al., Ala. Poly. Ext. C. 20, 51, 1918.
Starcher et al., Ala. Poly. Ext. C. 21, 59, 1918.
Thayer, Ohio Mo. B. 1, 114, 1916.
Weldon, Cal. Hort. B. 7, 401, 1918.

Spray formulas, arsenic in
Ellett & Grissom, Va. Tech. B. 8, 160, 1915.

Spray formulas, home garden
Whelan, Mich. Ext. B. 14, 1918.

Spray formulas, winter
Melander, Wash. Pop. B. 107, 1917.

Spray gun
Buckingham, Pac. Rur. Press, 95, 169, 1918.
Cruickshank, Ind. Hort. Soc. B. 1, 4, 4, 1919.
Cruickshank, Better Fruit, 14, 4, 12, 1919.
Gaylord, Ind. Hort. Soc. B. 1, 2, 15, 1919.

Spray injury
Childs, Oreg. Hort. Soc. R. 8, 20, 1917.
Fearing, Garden Mag. 25, 325, 1917.
Fisher, U. S. D. A. B. 712, 20, 1918.
Firor, So. Fr. Gr. 20, 76, 1916.
Gray, Cal. Hort. B. 7, 454, 1918.
Gray, Nat. Nurserym. 25, 306, 1918.
Gray, Cal. Hort. B. 7, 454, 1919.
Grossenbacher, Fla. Gr. 12, 5, 15, 1915.
Macoun, Can. Exp. Farms B. 86, 93, 1916.
Patten & O'Meara, Mich. Quar. B. 2, 83, 1919.
Whetzel et al., U. S. F. B. 736, 15, 1916.
Yothers, U. S. F. B. 933, 1918.

Spray materials
Christie, Ind. Ext. B. 80, 1919.
Conant, New Eng. Homest, 72, 21, 13, 1916.
Drinkard, Va. Hort. Soc. B. 5, 1, 4, 1917.
Frank, Wash. Mo. B. 6, 158, 1919.
Herrick, Amer. Agr. 97, 19, 16, 1916.
Herrick, N. Y. Dept. Farms & Markets, Agr. B. 109, 95, 1918.

Spray materials (*Cont'd.*)
Ralston & Marshall, Va. Ext. B. 14, 30, 1917
Sanders, Wis. Hort. Sup. 6, 7, 7, 1916.
Scott, Amer. Agr. 95, 11, 5, 1915.
Stewart, Penn. Hort. Assoc. Proc. 57, 18, 1916.
Waterbury, Yakima Hort. R. 1917, 20.
Spray nozzles
Burton, Farm Guide, 28, 277, 1916.
Crane, Proc. Amer. Hort. Soc. 14, 85, 1917.
Hutchins, Mich. Farm 148, 447, 1917.
Melander, So. Fr. Gr. 21, 40, 1917.
Woodworth, J. Agr. Res. 5, 1177, 1916.
Spray poisoning
Dean, Idaho Farm. 34, 44, 13, 1919.
Dean, Wash. Farm. 42, 18, 13, 1919.
Spraying*
Albia, Iowa Hort. Soc. Tr. 50, 279, 1916.
Alderman, W. Va. Ext. C. 172, 1918.
Alderman, Giddings & Rumsey, W. Va. C. 7, 46, 1913.
Allison, Iowa Hort. Soc. R. 52, 366, 1918.
Ayers, Tex. Comm. Agr. R. 10, 85, 1917.
Barss & Lovett, Oreg. Ext. B. 224, 1919.
Batchelder, Me. Ext. News L. 72, 1918.
Beach, Iowa Ext. B. 35, 18, 1915.
Beach, Iowa Hort. Soc. Tr. 50, 294, 1916.
Beach, Wis. Hort. Soc. R. 49, 106, 1919.
Bentley, Tenn. B. 121, 1918.
Berger, Cal. Hort. B. 6, 302, 1917.
Blackman & Ellis, N. Y. St. Col. For. Syracuse B. 16, 26, 113, 1916.
Bliss, Iowa Emerg. Leaf. 12, 1917.
Blodgett, Iowa Hort. Soc. R. 52, 50, 1918.
Brann, Cal. Hort. B. 8, 104, 1919.
Brittain, Nova Scotia Fr. Gr. Assoc. R. 53, 74, 1917.
Brittain, Nova Scotia Fr. Gr. Assoc. Ann. R. 1919, 102.
Brittain & Clinton, Conn. B. 184, 1914.
Britton & Zappe, Conn. B. 203, 259, 1917.
Brock, Ill. Hort. Soc. Tr. 63, 132, 1918.
Brown, Ill. C. 226, 3, 1918.
Caesar, Ont. Dept. Agr. B. 250, 3, 1917.
Cameron, N. J. R. 1914, 361.
Childs, J. Ec. Ent. 8, 457, 1915.
Childs, Oreg. B. 141, 19, 1917.
Chittenden, U. S. F. B. 1038, 16, 1919.
Chittenden & Orton U. S. F. B. 868, 1917.
Clausen, Cal. B. 258, 43, 1915.
Conant, Me. St. Pomol. Soc. R. 1916, 61, 71, 1917.
Cooper, Neb. Hort. Soc. R. 47, 187, 1916.
Cooper, Neb. B. 158, 1917.
Cooper, Neb. Hort. Soc. R. 49, 241, 1918.
Cory, Peninsula Hort. Soc. Tr. 30, 62, 1917.
Cory, Peninsula Hort. Soc. Tr. 31, 76, 1918.
Cory, Del. St. Agr. B. 4, 3, 67, 1915.
Coy, Cal. Hort. B. 5, 453, 1917.
Crane, W. Va. C. 12, 1914.
Cruickshank, Ind. Hort. Soc. B. 1, 4, 11, 1919.
Darrow, U. S. F. B. 1024, 25, 1919.
Day, Ill. Hort. Soc. Tr. 63, 80, 1918.
Dean, Kans. Hort. Soc. Tr. 33; 27, 34, 188, 1916.
Dean, Mont. Hort. Bd. Bien. R. 9, 13, 1917.
Derby, Peninsula Hort. Soc. Tr. 31, 16, 1918.
Drew, Ext. News Mass. 1, 18, 3, 1918.
Dunlap, Wis. Hort. Soc. R. 46, 66, 1916.
Dunlap, Wis. Hort. Sup. 6, 7, 1, 1916.
Dunlap, Wis. Hort. Sup. 7, 8, 1, 1917.
Dunlap, Ill. Hort. Soc. Tr. n. s. 51, 146, 1917.
Eustace & Pettit, Mich. Sp. B. 73, 1915.
Eustace & Pettit, Mich. Sp. B. 93, 1919.
Farley, Mass. Fr. Gr. Assoc. R. 21, 118, 1915.
Farley, N. J. Hort. Soc. Proc. 43, 70, 1918.
Farrand, Mich. Hort. Soc. R. 45, 124, 1915.
Flint, Ill. Hort. Soc. Tr. 63, 222, 1918.
Forbes, Ill. Ent. R. 28, 68, 1915.
Foster, Cal. Hort. B. 4, 250, 1915.
Foster, Mont. Hort. Soc. Proc. 18, 16, 1915.
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Wiggan, Mo. St. Bd. Agr. R. 48, 393, 1916.

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Beach, Iowa Ext. B. 35, 27, 1915.

Spraying, blackberries
Eustace & Pettit, Mich. Sp. B. 93, 17, 1919.

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Kiethly, Wis. Hort. 9, 93, 1919.

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Beach, Iowa Ext. B. 35, 29, 1915.

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Imes, U. S. F. B. 909, 9, 1918.

Spraying, cherries
Barss & Lovett, Oreg. Ext. B. 196, 1917.
Beach, Iowa Ext. B. 35, 23, 1915.
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Tenny, Fla. Gr. 13, 18, 10, 1916.
Watson, Fla. Gr. 19, 12, 25, 1919.
Yothers, Fla. Gr. 15, 10, 5, 1917.
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Cookingham, C. Gentl. 83, 16, 34, 1918.
Drake, Penn. Farm. 43, 579, 1918.
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Brehm, C. Gentl. 80, 655, 1915.
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Beach, Iowa Ext. B. 35, 27, 1915.
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Stewart, Penn. Farm. 39, 30, 1916.

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Gossard, Ohio Farm, 554, 1917.
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Stack, Farm Engineering 3, 1, 11, 1916.

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Spraying, garden insects
Frank, Wash. Mo. B. 5, 50, 1917.

Spraying, gooseberries
Eustace & Pettit, Mich. Sp. B. 93, 16, 1919.

Spraying, grape
Beach, Iowa Ext. B. 35, 26, 1915.
Carmody, Ky. Ext. C. 30, 8, 1915.
Eustace & Pettit, Mich. Sp. B. 93, 15, 1919.
Hartzell, N. Y. St. Fr. Gr. Assoc. Proc. 14, 127, 1915.

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Somes, Mo. Fruit C. 9, 1915.
Stuckey, So. Cult. 75, 11, 24, 1917.
Stuckey, So. Cult. 76, 10, 23, 1918.

Spraying, grasshoppers
McCall, Gem St. Rural 22, 2, 1, 1916.

Spraying, Heliothis obsoleta
M'Colloch, Or, Judd Farm. 61, 2, 6, 1916.

Spraying, house plants
Gall, Can. Hort. 38, 34, 1915.

Spraying, irrigation system
Skinner, Fruitm. & Gardn. 18, 7, 8, 1915.

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Beach, Iowa Ext. B. 28, 1915.

Spraying, Missouri
Howard, Mo. B. 124, 1915.

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Talbert, New Eng. Farms 2, 41, 10, 1919.

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Strickland & Peet, N. Y. Dept. Farms & Markets B. 106, 1918.

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O'Byrne, Fla. Gr. 20, 20, 8, 1919.

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Winberg, Ala. Farm Facts 4, 92, 9, 1919.

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Alderman, Nat. Stock. & Farm. 39, 1275, 1916.
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Beach, Iowa Ext. B. 35, 1915.
Blodgett, Iowa Hort. Soc. Tr. 52, 50, 1918.
Bunting, J. Agr. Quebec 18, 207, 1915.
Caesar, Ont. Dept. Agr. B. 250, 3, 1917.
Conradi & Barre, S. C. Ext. C. 17, 1919.
Cooper, Neb. Ext. B. 24, 1914.
Curtiss, Iowa R. 1918, 32.
Dean, Kans. Hort. Soc. Trans. 34, 202, 1918.
Dunlap, Minn. Hort. 44, 119, 1916.
Frank, Wash. Mo. B. 5, 171, 1917.
Garman, Ky. Agr. Labor & Stat. Bien. R. 22, 425, 1918.
Herrick, Iowa Dept. Agr. R. 19, 493, 1919.
Herron, Miss. Ext. C. 19, 1917.
Hoffman et al., S. C. Ext. C. 18, 19, 1919.
Lewis, Kans. B. 203, 1915.
McDowell, Pa. St. Col. Ext. C. 55, 1917.
Perrine, Ill. Hort. Soc. Tr. n. s. 51, 265, 1917.
Rees, Wash. Mo. B. 2, 12, 10, 1915.
Sanders, Me. St. Pomol. Soc. R. 1915, 30, 1916.
Sherman, N. C. Dept. Agr. B. 209, 27, 1915.
Sherman, N. C. R. 38, 20, 1915.
Sherman, N. C. Ext. C. 66, 1918.
Simmons, Minn. Hort. 45, 109, 1917.
Wilson, Wis. Agr. 41, 8, 1, 1917.

Spraying, Ozarks
Radder, C. Gentl. 84, 3, 13, 1919.

Spraying, peach*
Barss & Lovett, Oreg. Ext. B. 195, 1917.
Beach, Iowa Ext. B. 35, 23, 1915.
Chase, Ga. Ent. C. 21, 1917.
Drew, Va. Dept. Agr. B. 109, 101, 1916.
Eustace & Pettit, Mich. Sp. B. 93, 9, 1919.
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Gillam, N. J. Ext. B. 1, 13, 51, 1917.
Lanham & Hayes, Tex. Ext. B. 29, 26, 1916.
Richards, Ind. Hort. Soc. Tr. 1915, 432, 1916.
Roberts, Peninsula Hort. Soc. Tr. 29, 30, 1916.
Sherman, N. C. Dept. Agr. B. 209, 32, 1915.
Sherman, N. C. R. 38, 21, 1915.
Watson, Tenn. Ext. Pub. 30, 1917.

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Barss, Oreg. St. Bd. Hort. Bien. R. 15, 66, 1919.
Barss & Lovett, Oreg. Ext. B. 193, 1917.
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